WHAT IS CLAIMED IS:

1. A wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

an optical train disposed between the input port and output ports providing optical paths for routing the spectral bands, the optical train including a half-wave plate and a dispersive element disposed to intercept light traveling from the input port, the optical train being configured so that light encounters the dispersive element and the half-wave plate twice before reaching any of the output ports; and

a routing mechanism having at least one dynamically configurable routing element to direct a given spectral band to different output ports depending on a state of the dynamically configurable routing element.

2. The wavelength router recited in claim 1 wherein the optical train comprises a free-space optical train.

3. The wavelength router recited in claim 1 wherein the routing mechanism includes a plurality of retroreflecting elements, each associated with a respective one of the spectral bands.

4. The wavelength router recited in claim 3 wherein at least one of the retroreflecting elements is configured to reflect the given spectral band an even number of times.

5. The wavelength router recited in claim 4 wherein each of the retroreflecting elements is configured to reflect the given spectral band twice.

6. The wavelength router recited in claim 3 wherein each of the retroreflecting elements includes a rotational degree of freedom.

7. The wavelength router recited in claim 1 wherein a fast axis of the half-wave plate is oriented substantially at an odd multiple of 22.5° with respect to a polarization axis of the given spectral band.

8. The wavelength router recited in claim 1 wherein the dispersion element comprises a grating.

9. The wavelength router recited in claim 1 wherein:

the optical train further includes a lens;

the dispersive element comprises a reflection grating;

light coming from the input port is collimated by the lens and dispersed by the reflection grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the lens on respective dynamically configurable routing elements comprised by the routing mechanism; and

the half-wave plate is disposed between the reflection grating and the routing mechanism.

10. The wavelength routing element recited in claim 9 wherein the half-wave plate is disposed between the lens and the reflection grating.

11. The wavelength routing element recited in claim 9 wherein the half-wave plate is disposed between the lens and the routing mechanism.

12. The wavelength routing element recited in claim 1 wherein:

the optical train further includes a first lens and a second lens;

the dispersive element comprises a transmissive grating;

light coming from the input port is collimated by the first lens and dispersed by the transmissive grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the second lens on respective dynamically configurable routing elements comprised by the routing mechanism; and

the half-wave plate is disposed between the transmissive grating and the routing mechanism.

13. The wavelength routing element recited in claim 12 wherein the half-wave plate is disposed between the transmissive grating and the second lens.

14. The wavelength routing element recited in claim 12 wherein the half-wave plate is disposed between the second lens and the routing mechanism.

15. The wavelength routing element recited in claim 1 wherein:

the dispersive element comprises a reflection grating;

the optical train further includes a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward the reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light on respective dynamically configurable routing elements comprised by the routing mechanism.

16. A wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

an optical train disposed between the input port and output ports providing optical paths for routing the spectral bands, the optical train including a quarter-wave plate having a fast axis oriented substantially at an odd multiple of 45° with respect to a polarization axis of the spectral bands and a dispersive element disposed to intercept light traveling from the input port, the optical train being configured so that light encounters the dispersive element and the quarter-wave plate twice before reaching any of the output ports; and

a routing mechanism having a plurality of retroreflecting elements, each such retroreflecting element being configured to reflect a respective one of the spectral bands an odd number of times to direct the respective one of the spectral bands to different output ports depending on a state of the retroreflecting element.

17. The wavelength routing element recited in claim 16 wherein at least one of the retroreflecting elements is configured to reflect the respective one of the spectral bands three times.

18. The wavelength routing element recited in claim 16 wherein:

the optical train further includes a lens;

the dispersive element comprises a reflection grating;

light coming from the input port is collimated by the lens and dispersed by the reflection grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the lens on the respective retroreflecting elements; and

the quarter-wave plate is disposed between the reflection grating and the routing mechanism.

19. The wavelength routing element recited in claim 18 wherein the quarter-wave plate is disposed between the lens and the routing mechanism.

20. The wavelength routing element recited in claim 16 wherein:

the optical train further includes a first lens and a second lens;

the dispersive element comprises a transmissive grating;

light coming from the input port is collimated by the first lens and dispersed by the transmissive grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the second lens on the respective retroreflecting elements; and

the quarter-wave plate is disposed between the transmissive grating and the routing mechanism.

21. The wavelength routing element recited in claim 20 wherein the quarter-wave plate is disposed between the second lens and the routing mechanism.

22. The wavelength routing element recited in claim 16 wherein:

the dispersive element comprises a reflection grating;

the optical train includes a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward the reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light on the respective retroreflecting elements.

23. A wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

an optical train disposed between the input port and output ports providing optical paths for routing the spectral bands, the optical train including a quarter-wave plate and a dispersive element disposed to intercept light traveling from the input port, the optical train being configured so that light encounters the dispersive element and the quarter-wave plate twice before reaching any of the output ports; and

a routing mechanism having a plurality of retroreflecting elements, each such retroreflecting element being configured to reflect a respective one of the spectral bands an odd number of times greater than two to direct the respective one of the spectral bands to different output ports depending on a state of the retroreflecting element.

24. The wavelength routing element recited in claim 23 wherein:

the optical train further includes a lens;

the dispersive element comprises a reflection grating;

light coming from the input port is collimated by the lens and dispersed by the reflection grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the lens on the respective retroreflecting elements; and

the quarter-wave plate is disposed between the reflection grating and the routing mechanism.

25. The wavelength routing element recited in claim 23 wherein:

the optical train further includes a first lens and a second lens;

the dispersive element comprises a transmissive grating;

light coming from the input port is collimated by the first lens and dispersed by the transmissive grating as a plurality of angularly separated beams corresponding to the spectral bands;

the angularly separated beams are focused by the second lens on the respective retroreflecting elements; and

the quarter-wave plate is disposed between the transmissive grating and the routing mechanism.

26. The wavelength routing element recited in claim 23 wherein:

the dispersive element comprises a reflection grating;

the optical train includes a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward the reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light on the respective retroreflecting elements.

27. A method for directing a light beam having a plurality of spectral bands received at an input port, the method comprising:

collimating the light beam;

dispersing the collimated light beam into a plurality of angularly separated beams corresponding to the spectral bands;

propagating the angularly separated beams through a half-wave plate;

focusing the angularly separated beams; and

routing the angularly separated beams to respective ones of a plurality of output ports.

28. The method recited in claim 27 wherein routing the angularly separated beams to respective ones of the plurality of output ports comprises retroreflecting the angularly separated beams by reflecting each such angularly separated beam an even number of times.

29. The method recited in claim 28 wherein routing the angularly separated beams to respective ones of the plurality of output ports further comprises again propagating the angularly separated beams through the half-wave plate.

30. The method recited in claim 27 wherein a fast axis of the half-wave plate is oriented substantially at an odd multiple of 22.5° with respect to a polarization axis of the angularly separated beams.

31. A method for directing a light beam having a plurality of spectral bands received at an input port, the method comprising:

collimating the light beam;

dispersing the collimated light beam into a plurality of angularly separated beams corresponding to the spectral bands;

propagating the angularly separated beams through a quarter-wave plate having a fast axis oriented substantially at an odd multiple of 45° with respect to a polarization axis of the angularly separated beams;

focusing the angularly separated beams; and

retroreflecting the angularly separated beams by reflecting each such angularly separated beam an odd number of times.

32. The method recited in claim 31 wherein routing the angularly separated beams to respective ones of the plurality of output ports further comprises again propagating the angularly separated beams through the quarter-wave plate.

33. A method for directing a light beam having a plurality of spectral bands received at an input port, the method comprising:

collimating the light beam;

dispersing the collimated light beam into a plurality of angularly separated beams corresponding to the spectral bands;

propagating the angularly separated beams through a quarter-wave plate;

focusing the angularly separated beams; and

retroreflecting the angularly separated beams by reflecting each such angularly separated beam an odd number of times greater than two.

34. The method recited in claim 33 wherein the number of times is three.

35. The method recited in claim 33 wherein routing the angularly separated beams to respective ones of the plurality of output ports further comprises again propagating the angularly separated beams through the quarter-wave plate.

36. A wavelength router for receiving, at an input port, a beam having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

means for collimating the beam;

means for dispersing the collimated beam into a plurality of angularly separated beams corresponding to the spectral bands;

means for 90° rotation of polarization components of the angularly separated beams; and

means for routing the angularly separated beams to the output ports.

37. The wavelength routing element recited in claim 36 wherein the means for 90° rotation of polarization components has a fast axis oriented substantially at an odd multiple of 22.5° with respect to a polarization axis of the angularly separated beams.

38. A wavelength routing element for receiving, at an input port, a beam having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

means for collimating the beam;

means for dispersing the collimated beam into a plurality of angularly separated beams corresponding to the spectral bands;

means for 45° rotation of polarization components of the angularly separated beams, wherein such means for 45° rotation has a fast axis oriented substantially at an odd multiple of 45° with respect to a polarization axis of the angularly separated beams; and

means for routing the angularly separated beams to the output ports, such means for routing including means for retroreflecting the angularly separated beams by reflecting each such angularly reflected beam an odd number of times.

39. The wavelength routing element recited in claim 38 wherein the number of times is three.